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Ephemeris for determining the Positions of the Satellites of Uranus, 1876. By Mr. A. Marth.

0^h G.M.T.	Ariel.		Umbriel.		Titania.		Oberon.	
	ω	diff.	ω	diff.	ω	diff.	ω	diff.
1876.	°	°	°	°	°	°	°	°
Jan. 1	261·63		290·79		91·95		258·99	
		714·19		434·33		206·74		133·68
6	255·82		5·12		298·69		32·67	
		·18		·33		·73		·67
11	250·00		79·45		145·42		166·34	
		·17		·33		·73		·67
16	244·17		153·78		352·15		300·01	
		·17		·32		·73		·66
21	238·34		228·10		198·88		73·67	
		·16		·32		·72		·66
26	232·50		302·42		45·60		207·33	
		·15		·31		·72		·66
31	226·65		16·73		252·32		340·99	
		·14		·31		·72		·66
Feb. 5	220·79		91·04		99·04		114·65	
		·14		·30		·72		·66
10	214·93		165·34		305·76		248·31	
		·13		·30		·72		·66
15	209·06		239·64		152·48		21·97	
		·13		·30		·71		·65
20	203·19		313·94		359·19		155·62	
		·12		·30		·71		·65
25	197·31		28·24		205·90		289·27	
		·12		·29		·71		·66
Mar. 1	191·43		102·53		52·61		62·93	
		·11		·29		·71		·66
6	185·54		176·82		259·32		196·59	
		·11		·29		·72		·66
11	179·65		251·11		106·04		330·25	
		·11		·29		·72		·66
16	173·76		325·40		312·76		103·91	
		·10		·29		·72		·66
21	167·86		39·69		159·48		237·57	
		·11		·29		·72		·67
26	161·97		113·98		6·20		11·24	
		·11		·30		·72		·67
31	156·08		188·28		212·92		144·91	
		·10		·30		·73		·67
Apr. 5	150·18		262·58		59·65		278·58	
		·11		·30		·73		·68
10	144·29		336·88		266·38		52·26	
		·11		·30		·73		·68
15	138·40		51·18		113·11		185·94	
		·11		·30		·74		·68
20	132·51		125·48		319·85		319·62	
		·11		·31		·74		·69
25	126·62		199·79		166·59		93·31	
		714·12		434·31		206·74		133·69
30	120·74		274·10		13·33		227·00	

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	log b	p_0 °	Ariel. log a	Umbriel. log a	Titania. log a	Oberon. log a
Jan. 1	9·6425 *n*	9·20	1·1762	1·3202	1·5351	1·6613
6	·6450	9·14	·1774	·3214	·5363	·6626
11	·6477	9·08	·1786	·3225	·5375	·6637
16	·6505	9·01	·1795	·3235	·5384	·6646
21	·6535	8·94	·1803	·3243	·5392	·6654
26	·6566	8·86	·1809	·3248	·5398	·6660
31	·6597	8·79	·1813	·3252	·5402	·6664
Feb. 5	·6629	8·71	·1815	·3255	·5404	·6666
10	·6660	8·63	·1815	·3255	.5404	·6666
15	·6691	8·55	·1813	·3253	·5402	·6664
20	·6721	8·47	·1809	·3249	·5398	·6660
25	·6750	8·40	·1804	·3243	·5393	·6655
Mar. 1	·6778	8·33	·1796	·3236	·5385	·6647
6	·6804	8·26	·1787	·3227	·5376	·6638
11	·6828	8·19	·1776	·3216	·5365	·6627
16	·6850	8·13	·1764	·3204	·5353	·6615
21	·6869	8·08	·1750	·3190	·5339	·6601
26	·6885	8·03	·1735	·3175	·5324	·6586
31	·6900	7·99	·1719	·3159	·5308	·6570
Apr. 5	·6912	7·96	·1702	·3142	·5291	·6553
10	·6921	7·94	·1684	·3124	·5273	·6535
15	·6927	7·92	·1665	·3105	·5254	·6516
20	·6929	7·92	·1646	·3086	·5235	·6497
25	·6928	7·92	·1627	·3067	·5216	·6478
30	9·6926 *n*	7·93	1·1607	1·3047	1·5196	1·6458

The values of ω, log b, p_0, and log a are to be interpolated for the times for which the positions of the satellites are wanted. The angles of position p and distances s are then found by means of the equations—

$$\frac{s}{a}\sin(p-p_0) = b\sin\omega,$$

$$\frac{s}{a}\cos(p-p_0) = \cos\omega.$$

The factor b (the sine of the Earth's latitude above the plane of the orbits) being at present negative, the angles of position decrease with increasing values of ω (the satellites' longitudes in their orbits reckoned from the points of their greatest northern elongations, p_0 denoting the angle of position of the major axes a of the apparent orbits).

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In case polar-coordinates p and s of the satellites are directly observed, these, or equivalent formulæ, or the kindred ones given in *Astron. Nachrichten*, No. 1040, will be found preferable to those adopted by von Asten and Newcomb, not only on account of their greater simplicity, but still more on account of the far greater facility and directness which they afford for computing the differential coefficients in the equations of condition for correcting the assumed elements.

Drawing of the Ring Nebula in Lyra (R.A. $18^h\ 48^m\ 20^s$: N.P.D. 57° 8′ 57″ [1860·0]). By Edward S. Holden, Prof. Math. U.S. Navy.

(*Communicated by Rear-Admiral C. H. Davis, U.S. Navy, Superintendent U.S. Naval Observatory.*)

The original drawing in pastel (of which a photograph on the same scale is sent herewith—viz. 1 inch = 20″) was constructed from the following measurements taken with the 26-inch Equatoreal of the Naval Observatory, with a magnifying power of about 400 diameters:

1874, June 13. Major axis = 77″·3; minor axis = 58″·0. Observer, Newcomb. N.B. The distances are only for the brighter portions.

1874, Aug. 10. Rough sketch of the nebula and surrounding stars. S. W. Burnham and Holden.

1875, July 7. Angles of position of four lines from bright star A (brightest in a field of 6′) tangent to the outer and inner ovals of the luminous ring.

AB_2 = 239°; B_2 on South side of external oval.

AB_4 = 248°; B_4 on South side of interior oval.

AB_3 = 289°; B_3 on North side of interior oval.

AB_1 = 303°; B_1 on North side of exterior oval.

Differences of Right Ascension between star A and tangents to the *preceding* and *following* sides of both interior and exterior ovals, the differences being measured with the micrometer:

A and n_1 = 22″·58; n_1 on *following* edge of exterior oval: (n_1 is not the extreme point, but it is where the nebulosity begins to be definite.)

A and n_2 = 36″·31; n_2 on *following* edge of interior oval (in this again there is well-marked nebulosity *preceding* n_2, that is, inside the interior oval).

A and n_3 = 82″·27; n_3 on *preceding* edge of interior oval.

A and n_4 = 102″·96; n_4 on *preceding* edge of exterior oval.

A and n'_4 = 105″·25; n'_4 on extreme limit of *preceding* nebulosity.

Observer, Holden.